

WHAT IS CLAIMED IS:

SUB A1

1 1. A compound having a structure selected from:  
2 X—R—A—Q—(Y)<sub>n</sub>, R—X—A—(Y)<sub>n</sub>—Q, R—X—A—Q—(Y)<sub>n</sub>, and  
3 X—R—A—(Y)<sub>n</sub>—Q

4 wherein,

5 A is a nucleic acid chain comprising nucleic acid monomers selected from  
6 the group consisting of natural nucleic acids, modified nucleic acids and combinations  
7 thereof;

8 R is a molecular energy transfer donor;

9 Q is a molecular energy acceptor; and

10 X and Y are the same or different and are non-nucleic acid stabilizing  
11 moieties that interact to bring R and Q into operative proximity, thereby enabling transfer  
12 of energy from R to Q; and

13 n is 0 or 1.

1 2. The compound according to claim 1, wherein said molecular  
2 energy donor is a fluorophore.

1 3. The compound according to claim 1, wherein said molecular  
2 energy acceptor is a fluorescence quencher.

1 4. The compound according to claim 1, wherein X and Y are both  
2 hydrophobic moieties.

1 5. The compound according to claim 4, wherein X and Y are  
2 members independently selected from the group consisting of saturated hydrocarbons,  
3 unsaturated hydrocarbons, steroids, fatty acids, fatty alcohols and hydrophobic peptides.

1 6. The compound according to claim 1, wherein natural nucleic acids  
2 are members selected from the group consisting of deoxyribonucleotides, ribonucleotides  
3 and combinations thereof.

1 7. The compound according to claim 6, wherein said modified  
2 nucleic acids are peptide nucleic acids.

1           8.     The compound according to claim 1, wherein said nucleic acid  
2 monomers are joined by linkages that are members independently selected from the group  
3 consisting phosphodiesters and modified phosphodiesters.

1           9.     The compound according to claim 8, wherein said modified  
2 phosphodiesters are members selected from the group consisting of phosphorothioates  
3 and phosphoramidates.

1           10.    The compound according to claim 1, wherein said nucleic acid  
2 sequence further comprises a hybridization enhancing moiety.

1           11.    The compound according to claim 10, wherein said hybridization  
2 enhancing moiety is a member selected from the group consisting of intercalating agents,  
3 minor groove binders and modified exocyclic bases.

1           12.    The compound according to claim 1 wherein X and Y are  
2 independently attached to members selected from the group consisting of a natural base  
3 of said nucleic acid chain, a modified base of said nucleic acid chain, a 3'-hydroxyl group  
4 of said nucleic acid chain, a 5'-hydroxyl group of said nucleic acid chain, a 2'-hydroxyl  
5 group of said nucleic acid chain, and a linkage joining nucleic acid groups in said nucleic  
6 acid chain.

1           13.    The compound according to claim 1, wherein said compound is  
2 immobilized on a solid surface.

1           14.    A method for amplifying DNA, wherein a compound according to  
2 claim 1 is a primer in said method.

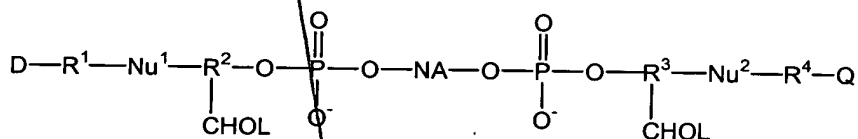
1           15.    The method according to claim 14, wherein said method comprises  
2 a member selected from the group consisting of polymerase chain reaction (PCR), nucleic  
3 acid sequence based amplification (NASBA), strand displacement amplification (SDA)  
4 and combinations thereof.

1           16.    A method for analyzing or quantitating DNA, wherein the  
2 compound according to claim 1 is used as a probe.

1                    17.    The method according to claim 16, wherein said method comprises  
2 a member selected from the group consisting of 5'-nuclease assay, rolling circle  
3 amplification and combinations thereof.

1                    18.    A kit for quantitating nucleic acid, said kit comprising a compound  
2 according to claim 1.

1                    19.    A compound having the formula:



2  
3 wherein,

4 CHOL is a cholesterol derivative;

5 R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are linker moieties independently selected from the  
6 group consisting of substituted or unsubstituted alkyl and  
7 substituted or unsubstituted heteroalkyl;

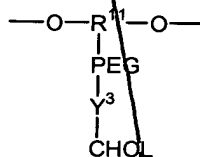
8 Nu<sup>1</sup> and Nu<sup>2</sup> are independently selected nucleotide residues;

9 NA is a nucleic acid sequence;

10 D is a donor of light energy; and

11 Q is a quencher of light energy.

1                    20.    The compound according to claim 19, wherein R<sup>1</sup> and R<sup>2</sup> are  
2 independently selected and have structures according to the formula:



3  
4 wherein,

5 R<sup>11</sup> is a member selected from the group consisting of substituted or unsubstituted  
6 alkyl and substituted or unsubstituted heteroalkyl;

7 PEG is polyethylene glycol;

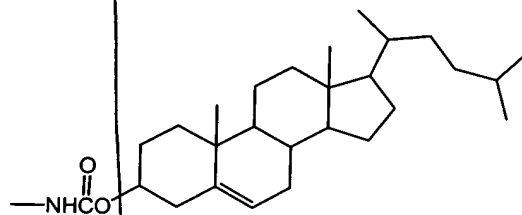
8 Y<sup>3</sup> is an organic functional group adjoining said PEG to said CHOL.

1                    21.    The compound according to claim 20, wherein said PEG has from  
2 about 2 to about 20 ethylene glycol subunits.

1                    22.    The compound according to claim 20 in which R<sup>11</sup> is substituted or  
2    unsubstituted alkyl.

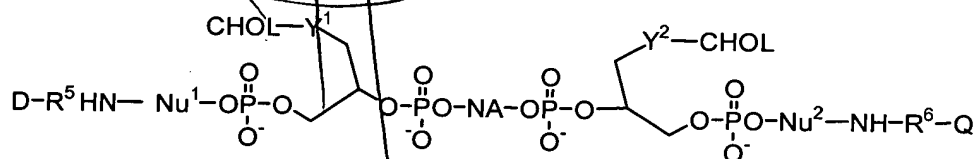
1                    23.    The compound according to claim 22, wherein R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>  
2    substituted or unsubstituted alkyl.

1                    24.    The compound according to claim 20, wherein Y<sup>3</sup>-CHOL has the  
2    structure:



1                    25.    The compound according to claim 19, wherein Nu<sup>1</sup> and Nu<sup>2</sup> are  
2    nucleotides having an exocyclic amine group to which -R<sup>1</sup>-D and -R<sup>4</sup>Q are attached,  
3    respectively.

1                    26.    A compound having the structure:



2                    wherein,

3                    NA is a nucleic acid sequence;

4                    Nu<sup>1</sup> and Nu<sup>2</sup> are independently selected nucleotide residues;

5                    Y<sup>1</sup> and Y<sup>2</sup> are linking groups independently selected from the group  
6                    consisting of substituted or unsubstituted alkyl and substituted or  
7                    unsubstituted heteroalkyl;

8                    R<sup>5</sup> and R<sup>6</sup> are linking groups independently selected from the group  
9                    consisting of substituted or unsubstituted alkyl and substituted or  
10                    unsubstituted heteroalkyl;

11                    D is a donor of light energy; and

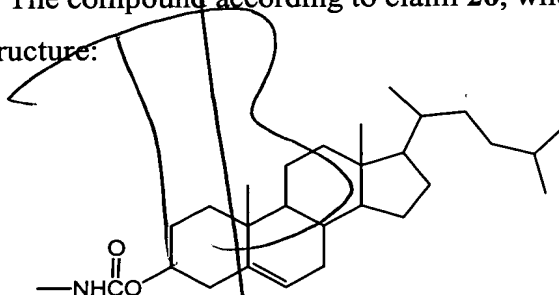
12                    Q is a quencher of light energy.

1                    27.    The compound according to claim 26, wherein  $Y^1$  and  $Y^2$  are  
2 members independently selected from substituted or unsubstituted alkyl and substituted or  
3 unsubstituted heteroalkyl.

1                    28.    The compound according to claim 27, wherein  $Y^1$  and  $Y^2$  are  
2 polyethylene glycol.

1                    29.    The compound according to claim 28, wherein said PEG has from  
2 about 2 to about 20 ethylene glycol subunits.

1                    30.    The compound according to claim 26, wherein  $Y^1$ -CHOL and  
2  $Y^2$ -CHOL have the structure:



1                    31.    The compound according to claim 19, wherein  $Nu^1$  and  $Nu^2$  are  
2 nucleotides having an exocyclic amine group to which  $-R^5-D$  and  $-R^6Q$  are attached,  
3 respectively.

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